

First Annual Report
OF THE
Merrimac Water Works
AND
Municipal Lighting Plant.



Year Ending January 31,
1905.

MERRIMAC, MASS.,
PRINTED BY THE MERRIMAC BUDGET,
CLIFTON B. HEATH, MANAGER.
1905.

First Annual Report
OF THE
Water Commissioners
AND
MUNICIPAL LIGHT BOARD
OF THE
Town of Merrimac, Mass.
FOR THE
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FIRST ANNUAL REPORT OF THE BOARD OF WATER COMMISSIONERS.

To the Citizens of the Town of Merrimac:

The Board of Water Commissioners herein present their first annual report, showing the expenditures of money under the vote of the town to construct a system of public water works.

The Commissioners held their first meeting February 19, 1904, and organized by choosing E. D. George, chairman and W. L. Smart, secretary.

Believing it to be the wishes of the town to construct an efficient and durable water plant, it has been our study that the construction should be, when complete, second to none for the needs of the town and nothing has been done without careful investigation.

Accordingly all materials and machinery and construction of every detail are of the best quality, and we were very fortunate to be able to purchase at very low prices.

The construction is substantially completed, the future work, for most parts, will be the extensions of pipe laying, as authorized from time to time by the vote of the town. In the near future probably, this will be very advantageous in

helping the town growth, as it will bring into the market real estate for building purposes, heretofore undesirable.

The water rates, rules and regulations for the use of water were compiled with great care and deliberation, and will compare favorably with those of other towns in this state. We believe that the work should be run on a business basis and no extension made without a 5 per cent. guarantee on the cost.

After careful consideration, Freeman C. Coffin of Boston was engaged as construction engineer to prepare all necessary plans, drawings, specifications and contracts, to furnish a wall map of the system, showing pipe lines, gates, hydrants, branches, location of pumping station, wells, standpipe, and location book for the location of gates, for the sum of three thousand dollars (\$3,000).

We feel that we were exceedingly fortunate in securing his services, as the efficiency and economy of the work testify to his ability and good judgment. Also the contractors lived up to the specifications as the stability of construction testifies, but one break and one leaky pipe showing in the nine miles of pipe since the mains were turned over to the town.

Appended to this report will be found a tabulated list of bids received and contracts awarded for the sale of bonds, the material and labor furnished in the construction of the system, together with the financial report, the report of the engineer, the rules and regulations, detail list of lengths of each size of pipe, number of gates and hydrants, etc.; also a map showing complete system.

We have, January 31, 1905, 162 service pipes connected with the mains and 187 water takers, and we expect a large increase in this direction the coming year.

Our income from water takers for the coming year with the services we have connected will be about \$1,600, and if

the town should appropriate for the use of water for 67 hydrants, watering trough and street sprinkling standpipe \$25 apiece, which would make \$1,725 00

Income from water rates,	1,600 00	
		\$3,325 00

this amount would not be sufficient for the running expenses and to pay the interest on the bonds, but as we have a balance on hand it would be all that is necessary for the ensuing year and leave a balance for service work, etc.

The contractor commenced laying pipe May 18th, and the pipe laying was complete and the water turned on to the standpipe Aug. 31st; the electric lights were turned on to the streets October 5th, but the boilers were fired up several weeks before.

It is hard to tell the exact amount of coal to charge up to the Water department but we will be better able to know what amount to charge to the departments after we have run a year. To January 31, 1905 we have consumed $165\frac{29}{224}$ gross tons of soft coal and $13\frac{35}{112}$ gross tons of coal screenings.

LAND.

According to an act of the legislature of 1903, chapter 281, the Commission voted to take a piece of land containing about 31 acres situated at the Lower Corner, on the Plains (so called) belonging to George W. Sargent, to locate a pumping station and a driven well system for our water supply. Mr. Sargent asked \$5,000 for the land and later dropped the price to \$3,500. We thought that the price was too high, therefore we have not made a settlement.

We also took a piece of land containing about one-half acre on Tucker hill (so called) belonging to E. C. and C. G. Little, to locate a standpipe for our water supply. They asked \$600 for this piece of land. We thought the price very high, therefore we have not made a settlement.

BONDS.

Bids were received and opened for \$84,000 four per cent. water bonds as follows:

E. H. Rollins & Sons,	102.91
Geo. A. Fernald & Co.,	103.04
Blake Brothers & Co.,	103.54
N. W. Harris & Co.,	104.87
Estabrook & Co.,	105.037
Blodget, Merritt & Co.,	105.047
R. L. Day & Co.,	105.353
Merrill, Oldham & Co.,	105.489

Merrill, Oldham & Co. were awarded the bonds at 105.489, the premium amounting to \$4,610.76.

PUMPING STATION.

Bids were received and opened on pumping station and chimney April 16, 1904.

	Building.	Chimney.
J. M. & C. J. Buckley,	\$8,940	\$1,000
H. P. Cummings Co.,	5,187	988
R. G. Adams,	5,976	1,487
W. N. Pike & Son,	5,492	813
Samuel R. Dixon,	6,979	990
J. J. & T. F. Mack,	5,953	1,322
Kelley Bros.,	complete	5,450

The contract for pumping station and chimney was awarded to Kelley Bros. at the above price.

COAL SHED.

Bids were asked for on coal shed at the pumping station and we received one bid from Kelley Bros. of \$225, and the contract was awarded to them.

PUMPING MACHINERY.

Including one compound, condensing, duplex, direct acting type with double acting water plungers, 1,000,000 gallons per 24 hours.

One Underwriters pump, 750 gallons per minute.

Two boilers and all of the piping to make a complete pumping plant.

The following bids were received:

Henry R. Worthington Pumping Engine Co.

Two pumps complete erected on foundation supplied by the town,	\$6,320.00
Two pumps complete and two boilers complete erected on foundation supplied by the town,	9,060.00

Dean Steam Pump Co.

Two pumps complete erected on foundation supplied by the town,	6,205.00
Two pumps complete and two boilers complete erected on foundation supplied by the town,	9,194.00

Stilwell Brice & Smith Vale Co.

Two pumps complete erected on foundation supplied by the town,	6,198.00
Deduct \$125 for cheaper condenser and revolution counter,	6,073.00

Charles River Iron Works.

Two boilers furnished and set,	3,982.65
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Hodge Boiler Works.

Two boilers furnished and set,	3,719.10
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Scannell Boiler Works.

Two boilers furnished and set,	3,503.85
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Barr Pump Co.

Two pumps complete set on foundation supplied by the town,	14,230.00
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Cunningham Iron Works.

Two boilers and furnishings set in brick,	3,800.00
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Roberts Iron Works Co.

Two boilers f. o. b. Boston,	2,390.00
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Charles River Iron Works.

Two boilers f. o. b. cars Merrimac,	2,786.00
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Setting the same,	953.00
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Hodge Boiler Works.

Two boilers set in masonry at pumping plant,	3,671.00
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Scannell Boiler Works.

Two boilers f. o. b. cars Merrimac,	2,150.00
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Deduct \$100 if their grates are not used,	2,050.00
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On Mr. Coffin's advice the bids were rejected and on March 30, 1904, we received the second bids on pumps.

F. A. Russell.

Two pumps complete set on foundation supplied by the town,	\$6,646.00
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Stilwell Brice & Smith Vale Co.

Two pumps complete set on foundation supplied by the town,	5,519.50
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Barr Steam Pump Co.

Main pump set on foundation supplied by the town,	5,168.00
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Dean Steam Pump Co.

Two pumps complete set on foundation supplied by the town; deducting some small details from the pump to the amount of \$58, and adding \$75 for 11 in. water plunger instead of 10 in. giving us pumping capacity of 847 gallons per minute instead of 700, which our engineer advised, and the contract was awarded to the Dean Steam Pump Co. for 5,835.00

Received and opened revised bids on boilers, April 16, 1904.

Scannell Boiler Works.

Two 6 ft. boilers as per specifications, delivered and set, \$3,365.00

Cunningham Iron Co.

Two 6 ft. boilers as per specifications, delivered and set, 3,800.00

Charles River Iron Works.

Two 6 ft. boilers as per specifications, delivered and set, 3,739.00

The Hodge Boiler Works.

Two 6 ft. boilers as per specifications, delivered and set, 3,550.00

The contract for boilers was awarded to the Scannell Boiler Works.

CONNECTING SUCTION MAINS AND DRIVEN WELLS.

Mr. Coffin recommended that we not ask for bids on laying suction mains and connecting wells. B. F. Smith & Bros. gave him a price which he thought was very satisfactory, and they were awarded the contract for \$1,484.90.

CAST IRON PIPE AND SPECIAL CASTINGS.

Specifications for bids on cast iron pipe and special castings: 470 tons of 6 in.; 81 tons of 8 in.; 197 tons of 10 in.; 154 tons of 12 in.; 15 tons of special castings.

Bids were received and opened March 5, 1904.

	6 in.	8 in.	10 in.	12 in.	Special Castings.
Warren F. and M. Co.	24.90	24.90	24.90	24.90	50.00
Camden Iron Works,	24.70	24.70	24.70	24.70	50.00
U. S. P. and F. Co.,	25.40	25.40	24.90	24.90	50.00
Donaldson Iron Co.,	24.37	23.48	23.00	20.00	50.00

The contract was awarded to the Donaldson Iron Co., at the above prices, with the right to increase or diminish the order 25 per cent. if necessary.

GATES AND HYDRANTS.

Bids were received and opened on gates and hydrants March 9, 1904.

	GATES.				HYDRANTS.	
	6 in.	8 in.	10 in.	12 in.	2 way	2 way and stmr.
Coffin Valve Co.,	10.75	16.50	24.50	34.50	27.90	29.15
Renssleer Mfg. Co.,	11.00	17.50	26.00	34.00	24.00	27.00
Eddy Valve Co.,	11.50	18.00	24.00	33.00	33.00	33.00
Kennedy Valve Mfg. Co.,	10.75	15.50	22.50	32.00	30.00	32.75
Chapman Valve Co.,	9.84	15.82	23.09	31.21	24.80	26.94
Luelton Valve Co.,	11.50	17.40	25.39	34.33	27.50	30.50
Norwood Engineering Co.,	8.75	15.20	22.50	32.00	23.92	25.72
R. D. Wood & Co.,	10.75	16.50	22.00	29.50	29.75	32.50
Sweet & Doyle,	9.50	16.75	22.50	32.00		

The bid from Sweet & Doyle was not accompanied with a certified check, and after hearing protest voted not to accept

the same and reject all bids. The contract for hydrants was awarded to the Norwood Engineering Co. for \$23.92 for 2 way and \$25.72 for 2 way and steamer.

Later the contract for gates was awarded to Sweet & Doyle for \$9.50, 6 in.; \$16.75, 8 in.; \$22.50, 10 in.; \$32.00, 12 in.

GATE BOXES.

On recommendation of Mr. Coffin the contract on gate boxes was awarded to the Norwood Engineering Co. for \$269.75. Mr. Coffin thought that this was the best box on the market.

STANDPIPE.

Bids were received and opened April 13, 1904, for standpipe, as follows:

The Hodge Boiler Works,	\$4,523.00
Cunningham Iron Works,	5,215.00
Davis & Farnum Manufacturing Co.,	5,588.00
The Portland Co.,	5,890.00
Reter-Conley Manufacturing Co.,	5,473.00
E. Kendal & Sons,	5,375.00

The contract for standpipe was awarded to The Hodge Boiler Works for \$4,523.00.

STANDPIPE FOUNDATION.

Bids were received and opened on standpipe foundation.

STANDPIPE ROOF.

Bids were asked for on standpipe roof. We received one bid from Kelly Bros., \$650.00, and the contract was awarded to them.

ROAD TO STATION.

Bids were asked for building road from street to pumping station, and we only received one bid, from Emerson & Blaisdell, \$262.00; and the contract was awarded to them.

PIPE, SPECIAL CASTINGS AND FITTINGS ON HAND.

List of cast iron pipe, special castings, service pipes fittings and coal on hand January 31, 1905:

1,500 lbs. of 12 in. pipe,	\$17.25
2,880 lbs. of 10 in. pipe,	32.12
2,160 lbs. of 8 in. pipe,	25.36
9,360 lbs. of 6 in. pipe,	112.00
480 lbs. of 4 in. pipe,	5.00
1 6 in. tee,	5.40
2 12 in. sleeves,	9.60
2 10 in. sleeves,	7.40
2 8 in. sleeves,	6.56
5 6 in. sleeves,	10.90
1 12 in. plug,	1.63
1 10 in. plug,	1.29
19 6 in. plugs,	11.97
1 2 way and steamer hydrant,	25.72
4,000 ft. of service pipe,	160.00
Service pipe fittings,	168.85
136 tons of coal at \$5.15,	700.40
30 meters,	312.00
	<hr/>
	\$1,613.45

Bids were received and opened on laying pipe April 6, 1904.

BIDDERS	Item No. 1 750 yds. Rock		Items 2 and 3 Trenching and Laying Pipe								Item 5 60 Hydrants		Item 6 Concrete Masonry 10 yds.		Item 7 Rubble Masonry 10 yds.		Item 11 1000 ft. B. M. Spruce Lumber		Sum total.
	Price per yd.	Total	6 in.	8 in.	10 in.	12 in.	Price per ft.	Total	Price per ft.	Total	Price per ft.	Total	Price for Setting	Total	Price per yd.	Total	Price per yd.	Total	
C. E. Trumble & Co.,	4.00	3,000.00	0.24	7,752.00	0.27	988.20	0.33	2,161.50	0.40	1,624.00	5.00	300.00	7.00	70.00	7.00	70.00	40.00	16,005	
M. McDonough,	3.75	2,812.50	0.20	6,460.00	0.25	915.00	0.25	1,637.50	0.35	1,421.00	1.00	60.00	8.00	80.00	6.00	60.00	30.00	13,476	
Cashman Bros.,	2.50	1,875.00	0.29	9,367.00	0.33	1,207.80	0.39	2,554.50	0.43	1,745.80	7.00	420.00	7.00	70.00	6.00	60.00	40.00	17,340	
Seymour-Clark-Hills Co.,	2.00	1,500.00	0.25	8,075.00	0.29	1,061.40	0.33	2,161.50	0.37	1,502.20	3.00	180.00	6.00	60.00	6.00	60.00	35.00	14,635	
Moore & Co.,	4.00	3,000.00	0.20	6,460.00	0.24	878.40	0.30	1,965.00	0.35	1,421.00	2.00	120.00	8.00	80.00	6.00	60.00	25.00	14,009	
*P. Malloy & Son,	2.00	1,500.00	0.19 1-2	6,298.50	0.22	805.20	0.27	1,768.50	0.30	1,218.00	2.00	120.00	7.00	70.00	5.00	50.00	40.00	11,870	
Colman Bros.,	4.50	3,375.00	0.38	12,274.00	0.41	1,490.60	0.49	3,208.50	0.60	2,436.00	3.00	180.00	8.00	80.00	5.00	50.00	40.00	23,135	
Booth & Co.,	3.25	2,437.50	0.23	7,429.00	0.26	951.60	0.32	2,096.00	0.35	1,421.00	2.00	120.00	4.50	45.00	4.50	45.00	40.00	14,585	
Loring M. Farnum,	2.90	2,175.00	0.19	6,137.00	0.21	768.60	0.24	1,572.00	0.28	1,136.80	2.00	120.00	7.50	75.00	6.00	60.00	33.00	12,077	
Gow & Palmer,	4.00	3,000.00	0.23	7,129.00	0.26	951.60	0.35	2,292.50	0.50	2,030.00	3.00	180.00	9.00	90.00	6.00	60.00	40.00	16,073	
C. N. Taylor,	3.50	2,625.00	0.21	6,783.00	0.23	841.80	0.26	1,703.00	0.29	1,177.40	3.00	180.00	7.00	70.00	5.00	50.00	20.00	13,450	
Parker & Gowan,	3.35	2,512.50	0.22 1-2	7,267.50	0.26	951.60	0.29 1-2	1,932.25	0.34	1,380.40	1.65	99.00	7.50	75.00	7.50	75.00	30.00	14,323	
Fred T. Ley & Co.,	4.00	3,000.00	0.42	13,566.00	0.56	2,049.60	0.52	3,406.00	0.69	2,801.40	5.00	300.00	7.0	70.00	6.00	60.00	30.00	25,283	
Lucian A. Taylor,	3.75	2,812.50	0.21	6,783.00	0.26	951.60	0.32	2,096.00	0.38	1,542.80	2.00	120.00	5.00	50.00	5.00	50.00	10.00	14,415	
Franklyn A. Snow,	3.50	2,625.00	0.22	7,106.00	0.25	915.00	0.30	1,965.00	0.35	1,421.00	2.00	120.00	4.00	40.00	30.00	40.00	30.00	14,222	
Brono & Milino,	3.00	2,250.00	0.22	7,106.00	0.24	878.40	0.30	1,965.00	0.38	1,542.80	1.75	105.00	10.00	100.00	10.00	100.00	30.00	14,077	
John H. McCusker,	3.75	2,812.50	0.21 1-2	6,944.50	0.27	988.20	0.35	2,292.50	0.50	2,030.00	2.00	120.00	10.00	100.00	8.00	80.00	30.00	15,367	

* The contract for laying pipe was awarded to P. Malloy & Son at the above prices.

FINANCIAL ACCOUNT.

PUMPING STATION AND CHIMNEY.

Kelley Bros., on account,	\$4,125 00
T. O'Brien, labor screening gravel for floor,	20 00
A. W. Sawyer, " " "	18 00
H. Evans, " " "	19 00
E. F. Goodwin, " " "	20 00
The Fairbanks Co., scales,	75 33
Mills & McClintock, piping,	13 68
I. B. Little Co., paint and supplies for roof,	20 93
S. C. Pease & Sons, varnish,	15 00
John Donahue, painting station roof,	30 70
W. W. Gormley, stock and labor,	4 85
L. M. Mann & Co., chimney cap,	64 30
	\$4,426 79

BOILERS.

Scannell Boiler Works, two boilers,	\$3,360 00
W. W. Gormley, stock and labor on stay rods,	5 00
Walworth Mfg. Co., oil feeder for boiler,	18 70
Hartford Steam Boiler Insurance Co., insurance on boilers 3 years,	90 00
	3,473 70

PUMPING MACHINERY.

Dean Steam Pump Co., on account,	\$4,000 00
	4,000 00

SUCTION PIPE SYSTEM.

Coffin Valve Co., 2 12 in. check valves,	\$125 00
Builders Iron Foundry, special castings,	124 95
Sweet & Doyle, 1 10 in. gate,	22 50
Sweet & Doyle, 1 12 in. gate,	32 00
Donaldson Iron Co., 12,000 ft. of 12 in. pipe,	138 00
Donaldson Iron Co., 18,000 ft. of 10 in. pipe,	207 00
Donaldson Iron Co., 10,845 ft. of 8 in. pipe,	127 31
Donaldson Iron Co., 7,050 ft. of 6 in. pipe,	85 90
Donaldson Iron Co., 2,030 ft. of 4 in. pipe,	25 30
B. F. Smith & Bro., part payment on connecting the well system,	1,343 10
	—————
	\$2,231 06

MAINTENANCE AT PUMPING STATION.

E. L. White, engineer,	\$373 00
C. E. Colman, asst. engineer,	34 00
F. B. Smith, asst. engineer,	252 00
Treat Hardware Co., bale,	10 26
Eagle Oil and Supply Co., bbl. oil, wheel-bar-	
row and supplies,	37 08
James Dickens, oil tank,	4 50
James Dickens, oil filter,	19 95
James Dickens, packing,	1 80
Crowe & Tupper, step ladder,	9 00
Coggeshall Mfg. Co., flue cleaner,	15 00
Sargent Coal Co., 301.29 tons coal,	1,557 63
Sargent Coal Co., 13.35 tons screenings,	33 28
Sargent Coal Co., 14 tons coal,	68 65
	—————
	2,416 15

BUILDING ROAD TO STATION.

Emerson & Blaisdell, grading,	\$262 00
L. B. Blaisdell, extra labor grading,	10 00
	—————
	272 00

COAL SHED.

W. H. Emerson, filling in around shed,	\$26 70
T. O'Brien, labor leveling ground for shed,	20 40
A. W. Sawyer, " " "	17 40
H. Evans, " " "	19 00
E. F. Goodwin, " " "	26 00
G. G. Davis, team and man,	5 10
Kelly Bros., building coal shed,	225 00

	\$339 60

STAND PIPE.

John M. Roche, foundation,	\$745 00
John M. Roche, extra labor,	15 00
Hodge Boiler Works, erecting standpipe,	4,423 00
Kelley Bros., erecting roof,	650 00
George E. Winslow, telemeter,	137 00
James Dickens, wire and labor connecting to pumping station,	48 96
Walworth Mfg. Co., pipe for telemeter weight,	6 55
G. W. Sargent Sons, six poles for telemeter line to street,	13 50

	6,039 01

PIPE LINE AND FITTINGS.

Donaldson Iron Co., cast iron pipe and special castings,	\$22,076 39
Builders Iron Foundry, special castings,	76 84
Sweet & Doyle, 77 gates, less freight,	728 43
Coffin Valve Co., 4 gates, less freight,	14 50
Norwood Engineering Co., 68 hydrants, less freight,	1,685 96
Norwood Engineering Co., 83 gate boxes, less freight,	196 21

	24,778 33

PIPE LAYING AND INSPECTING.

P. Maloy & Son, laying pipe,	\$11,267 28
W. C. Russell, inspecting pipe,	63 75
R. H. Sargent, inspecting pipe laying,	100 00
	————— \$11,431 03

SERVICE PIPE AND FITTINGS.

Coffin Valve Co., 200 gate boxes,	\$250 00
Walworth Mfg. Co., 3997 ft. 1 in. W. I. pipe,	179 86
" " 4010 ft. 1 in. W. I. pipe,	170 44
" " 5995 ft. 1 in. W. I. pipe,	227 81
" " 1013 ft. 1 1-2 in. W. I. pipe,	65 87
" " Lead pipe,	57 81
" " 200 goose neck connections,	
200 sidewalk cocks,	
200 stop waste cocks,	532 52
" " Supplies and fittings,	47 37
" " Hall tapping machine,	53 33
Union Meter Co., pipe lining machine,	45 00
" " pipe lining cone,	3 50
Waldo Bros., cement,	2 50
D. D. Chase Lumber Co., cement,	1 35
The Taylor-Goodwin Co., cement,	7 50
A. W. Tuckeman, supplies,	19 35
J. B. Judkins & Sons Co., stock for wagon rack,	51
H. L. Bond & Co., dynamite and caps,	13 20
	—————
	1,677 92

METERS.

National Meter Co., 200 5-S Empire AXX Meters,	\$2,080 00
	—————
	2,080 00

LABOR ON SERVICE PIPE.

Patrick Welch, labor laying pipe,	\$7 50
J. P. Flynn, " "	27 20
F. O. Bailey, " "	4 00
G. G. Davis, team putting in service pipe,	53 78
G. G. Davis, team putting in service pipe and setting meters,	30 51
J. P. Flynn, setting meters,	10 00
F. C. Williams, sharpening tools,	20 40
G. W. J. Murphy, making goose necks,	19 50
I. H. Pendergast, teaming and use of cart,	8 00
D. O. Leavitt.	85 60
J. P. Flynn,	126 00
E. F. Goodwin,	113 70
D. C. Bunker,	104 40
E. Bushong,	106 40
J. Stimpson,	99 90
C. Carter,	109 10
F. O. Bailey,	116 40
H. Evans,	114 20
J. Doyle,	54 70
A. W. Sawyer,	38 10
M. Blaisdell,	32 00
T. O'Brien,	42 80
J. Sizelan,	24 20
D. Stevens,	8 00
Wm. Sargent,	8 00
E. Hopkins,	8 00
G. S. H. Gilday,	35 40
Italian No. 1,	112 50
Italian No. 2,	112 50
Italian No. 3,	97 40
Italian No. 4,	73 50
	—
	\$1,803 69

ENGINEER.

Freeman C. Coffin, services,	\$3,000 00
	—
	3,000 00

EXPRESSAGE.

American Express Co., expressage,		\$0 50
" " expressage on gates,	7 18	
" " expressage on supplies,	75	
" " " "	35	
" " " "	35	
" " " "	60	
" " " "	1 60	
" " " "	1 84	
" " " "	1 65	
" " " "	2 10	
" " " "	4 55	
" " " "	1 00	
" " " "	65	
" " " "	45	
		—
		\$23 57

FREIGHT.

Bion Green, freight on hydrants,		\$21 64
" " hydrants and gate boxes,	18 79	
" " special castings,	2 88	
" " hydrants and gate boxes,	30 93	
" " gates,	9 22	
" " gates,	82 64	
" " special castings,	1 33	
" " supplies,	95	
" " supplies,	25	
" " bound stones,	2 73	
" " special castings,	2 20	
" " hydrants,	2 48	
" " supplies,	2 88	
" " supplies,	75	
" " service pipe and supplies,	13 04	
" " supplies,	1 02	
" " pipe,	72	
" " safe and pump,	26 60	
" " supplies,	36	
" " supplies,	1 01	
		—
		222 42

CLEARING UP GROUND AT STATION.

F. N. Thurlow, self and team,	\$12 90
A. Nicol, " "	6 00
R. H. Sargent, man and team,	25 40
G. G. Davis, " "	11 40
B. B. Wood, " "	6 00
W. H. Emerson, " "	14 30
E. C. Little, " "	13 20
I. H. Pendergast, " "	3 70
H. Evans, labor,	15 20
F. O. Bailey, labor,	8 00
E. Bushong, labor,	10 00
James Doyle, labor,	9 40
T. O'Brien, labor,	3 00
D. C. Bunker, labor,	10 00
H. Carter, labor,	12 63
E. F. Goodwin, labor,	22 00
Uriah Trull, labor,	4 20
Burton Lefaver, labor,	68
M. W. Sargent, labor,	6 00
E. D. George, pay roll Italians, labor on stumps,	6 00
	—
	\$200 01

REPAIRING PIPE LINE.

Sargent Coal Co., wood and coal for thawing pipe at Port,	\$7 06
Sargent Coal Co., wood and coal for thawing ground on Mill street to repair broken pipe,	10 74
	—
	17 80

EXPENSES OF INVESTIGATING
COMMITTEE.

Clifton B. Heath, treasurer, expenses of In- vestigating Committee on supply for water, 1903 and 1904,	\$2,344 12
	—
	2,344 12

SALARY.

E. D. George, Water Commissioner,	\$200 00
F. E. Pease, Water Commissioner,	200 00
Wm. L. Smart, Water Commissioner,	200 00
E. D. George, to services as Superintendent, Inspector and Clerk of department,	900 00
	—
	1,500 00

LOAN TO TOWN TREASURER,

ACCT. OF SELECTMEN.

Paid Clifton B. Heath, treasurer,	\$5,000 00
Paid Clifton B. Heath, treasurer,	5,000 00
Paid Clifton B. Heath, treasurer,	5,000 00
	—
	15,000 00

NOTES.

Clifton B. Heath, treasurer, note of April 25,	\$5,000 00
Clifton B. Heath, treasurer, note of June 27,	5,000 00
	—
	10,000 00

INTEREST.

Clifton B. Heath, treasurer, interest on note of April 25,	\$46 75
Clifton B. Heath, treasurer, interest on note of June 27,	13 33
Clifton B. Heath, treasurer, interest on water bonds,	1,680 00
	—
	1,740 08

MISCELLANEOUS.

Mrs. E. W. Smart, box rent and stamps,	\$12 50
Geo. E. Ricker, box rent and stamps,	1 25
The Globe Wernecke Co., letter file,	7 90
Chase Bros., letter press,	7 05
Little & Larkin, table, chairs and lamp,	23 00
Merrimac Budget, order book and stationery,	20 00
Merrimac Budget, printing and supplies,	27 00
Merrimac Budget, record book, ledger cards and printing,	39 70
Ropes, Gray & Gorham, typewritten letter for bonds,	10 00
The Forbes Lithograph Mfg. Co., printing water loan bonds,	125 00
C. B. Heath, expenses to Boston and telephoning,	9 55
I. B. Little Co., rubber mats for station,	34 70
I. B. Little Co., supplies,	10 58
A. W. Boynton, labor on hydrants,	2 50
G. G. Davis, repairs on highway, account of contractor,	7 83
L. B. Blaisdell, repairs on highway, account of contractor,	9 95
Crowe & Tupper, ladders,	8 00
James Busfield, machine work on plugs,	3 20
The Mosler Safe Co., safe,	125 00
S. C. Pease & Sons, stove and burlap,	2 25
Curtis & Wood, teaming,	4 05
H. H. Story, telephoning and supplies,	6 64
New England Tel. and Tel. Co., telephone rental and telephoning,	20 13
Thomas Lahey, 17 bound stones,	30 00
Hanscom Hardware Co., tile,	1 51
James Dickens, wiring shop,	6 39
W. W. Lydston, stock and labor on furnace,	10 25
W. W. Lydston, supplies,	10 91
N. L. Howe, stock and labor on gate wrenches,	9 93
N. F. Stevens, clock for station,	22 50
E. W. Roberts, splitting bound stones,	1 56

E. W. Roberts, stock and labor in shop,	\$3 40
John Donahue, setting glass in shop,	75
J. E. Currier, lumber, cement and tile for shop,	27 83
Carriage Wheel and Gear Co., stock for benches,	50
Annie Pease, caning four chairs,	4 00
Thorpe & Martin, books,	3 50
The Heliotype Printing Co., 1,000 maps of pipe system,	34 00
Moody & Bartlett, legal advice,	15 00
T. H. Hoyt, legal advice,	44 00
R. E. Honor, painting sand chamber,	2 00
D. M. Means, lettering sign,	1 75
B. Hosford, varnishing boxes,	75
Z. Lovell & Co., lantern, oil and supplies,	23 84
Sargent Coal Co., coal for office,	14 13
Merrimac Public Library, wood and coal,	10 00
F. E. Pease, expenses to Boston two times,	4 00
E. D. George, expenses to Boston five times,	10 00
E. D. George, expenses to Haverhill five times and expressage,	1 30
W. L. Smart, expenses to Walpole,	1 50
H. L. Bond & Co., tools,	132 67
H. L. Bond & Co., forge and supplies,	16 18
	—
	\$961 93

BALANCE SHEET.

RECEIPTS.

Note of April 25, 1904,	\$5,000 00
Note of June 27, 1904,	5,000 00
Water Bonds,	84,000 00
Premium on Bonds,	4,610 76
Interest on deposit in bank to July 1,	2 00
Interest on deposit in bank to Jan. 1, 1905,	307 23
Received for laying service pipe,	1,050 55
Received from water rates to April 1,	508 67
	————— \$100,479 21

EXPENDITURES.

Pumping station,	\$4,426 79
Boilers,	3,473 70
Pumping machinery,	4,000 00
Coal shed,	339 60
Building road to station,	272 00
Suction pipe system,	2,231 06
Pipe line and fittings,	24,778 33
Pipe laying and inspection,	11,431 03
Standpipe,	6,039 01
Clearing ground at station,	200 01
Loans to Town Treasurer, acct. Selectmen,	15,000 00
Notes of April 25 and June 27, 1904,	10,000 00
Interest on notes of April 25 and June 27,	60 08
Interest on water bonds, six months,	1,680 00
Expense of investigating committee, 1903-04,	2,344 12
Expressage,	23 57
Freight,	222 42
Service pipe and fittings,	1,677 92
Meters,	2,080 00
Labor on service pipe,	1,803 69
Salaries,	1,500 00
Maintenance,	2,416 15
Engineering,	3,000 00
Repairs on pipe line,	17 80
Miscellaneous,	961 93
*Balance on hand,	500 00
	————— \$100,479 21

Loaned to Town Treasurer, acct. Selectmen,	\$15,000 00
Interest due on loan to Town Treasurer,	188 02
*Balance on hand,	500 00
	————
	\$15,688 02

BALANCE DUE ON CONTRACTS.

Kelly Bros., due on building,	\$2,091 10
Dean Steam Pump Co., pumping machine,	1,835 00
B. F. Smith & Bro., suction pipe system,	141 80
Hodge Boiler Works, standpipe;	100 00
P. Maloy & Son, pipe laying,	588 05
	————
	\$4,755 95
Unexpended balance,	————
	\$10,932 07

* Through an error an order for \$21.64 was drawn on the light funds which should have been paid by the water department and on this account there is a discrepancy of this amount from the balance shown in the Treasurer's report.

EVERETT D. GEORGE,
FRANK E. PEASE,
WILLIAM L. SMART, } Water
{} Commissioners.

Merrimac, February 20, 1905.

ENGINEER'S REPORT.

MR. EVERETT D. GEORGE,

MR. FRANK E. PEASE,

MR. W. L. SMART,

Water Commissioners of the Town of Merrimac:

Gentlemen—I herewith submit my final report upon the construction of the Merrimac Water Works.

Early in March, 1904, I was engaged by you to prepare plans and contracts for a system of water works and to superintend their construction. A source of supply had been selected, after investigation and tests made by the writer under the direction of a committee of the town, consisting of Messrs. Everett D. George, Ralph H. Sargent and Alfred Colby, Selectmen, Thomas L. Goodwin, Frank E. Pease and Frederick C. Grant. This source has been tested by pumping continuously for two weeks, and had been approved by the Massachusetts State Board of Health as a suitable supply for the town.

Plans and specifications for the various parts of the work were prepared, and the contracts let as early as possible, the first contract let being for the cast iron pipe and special castings. This contract was awarded to the Donaldson Iron Company of Emaus, Pennsylvania.

The pipes were promptly delivered, were carefully inspected and found to be in accordance with the specifications, and satisfactory in every way. When the water was let into the system there were only two leaks discovered, which were caused by defective pipes. The cost of replacing these pipes, and also the cost of all pipes found broken on the cars, and the cost of cutting the same, was borne by the Donaldson Iron Company, as required by their contract.

The hydrants were furnished by the Norwood Engineering Company of Florence, Massachusetts, there being sixty-seven in all. The gate boxes for the gates on the street mains were also furnished by the Norwood Engineering Company.

The gates valves were furnished by Sweet & Doyle of Boston. The valves gave some trouble at first by reason of leakage at the packing about the stem. They were repacked by the contractors under the direction of the superintendent, and are apparently in good condition at the present time.

TRENCHING AND LAYING PIPE.

The contract for trenching and laying the street piping, setting hydrants and gates, and other work connected therewith, was awarded to P. Malloy & Son of Waltham. Work was begun on the 10-inch field line, starting at the pumping station on May 16th, 1904. The work of pipe laying was completed about September 1st, 1904.

The laying of the pipes was carefully inspected and well done. There were no leaks in the joints and no cracked pipes were laid, the only broken pipes being those noted above, in which the defects could not be detected at the time they were laid.

The total length of the piping system, including hydrant branches, is 8.652 miles of pipe from 6 to 12 inches in diameter. This is given in detail in the accompanying schedule. Also accompanying this report is a table giving the elevations above sea level of the hydrants, and the heads and pressures at the hydrants due to a full stand pipe. There is also a map showing the entire system.

DRIVEN WELL SYSTEM.

The supply is taken from the ground by means of a driven well system. This system consists of 18 pipe wells of 2 1-2 inch extra heavy wrought iron pipe driven to a depth of about 35 feet below the surface of the ground. Each well is connected to the main suction pipe by extra heavy 2 1-2 inch wrought iron pipe, and a short lead pipe connection or gooseneck.

The wells are approximately 50 feet apart. The suction pipes to which the wells are connected are composed of the following lengths of cast iron pipe: 310 feet of 10-inch, 233 feet of 8-inch, 238 feet of 6-inch, and 93 feet of 4-inch.

This suction line is connected to the pumps by 12-inch pipe. The contract for laying the suction pipe and connecting the wells was awarded to B. F. Smith & Brother of Boston. This firm also drove the wells. Sixteen of them were driven in the fall of 1903, and a pumping test made, as already described.

The entire well system seems to be completely successful, and promises to furnish an abundant and satisfactory supply for the present needs of the town, and probably for many years in the future.

PUMPING STATION.

The pumping station consists of a plain, substantial brick building for the engine and boiler rooms, a brick chimney and a coal yard.

The boiler and engine rooms were built to accommodate the boilers, engines and dynamos required for the municipal electric lighting plant, as well as the pumping machinery. This is an excellent arrangement, as both plants are operated by the same men.

The contract for the pumping station was awarded to Kelly Brothers of Haverhill. This work was done in a first class manner and is very satisfactory.

The excavation for the station was started on May 5th, 1904, this being the first ground broken in the construction of the works.

THE STAND PIPE.

There being no land available at a sufficient elevation for a reservoir, a stand pipe was necessary to provide suitable pressure for fire protection. The original design of the works contemplated a stand pipe 45 feet high by 30 feet in diameter. When however, the final plans were prepared, it was found that the price of cast iron pipe had decreased materially, making a considerable saving in the cost of the quantity required for the pipe lines. This being the case, it was thought desirable to increase the diameter of the stand pipe to 40 feet, thus securing a capacity of 420,000 gallons instead of 240,000, which is that of one 30 feet in diameter.

The additional cost for the stand pipe, its foundation and roof, over that for the 30-foot stand pipe was about \$1700. This sum

was well expended in securing the additional capacity in the standpipe.

The stand pipe is built of plates of mild steel of a tensile strength of 54,000 to 60,000 pounds per square inch. The thickness of the plates is given in the following table:

Table.

Bottom of tank	3-8 inch thick
The first 5 feet in height of the side plates, ..	1-2 inch thick
The next 5 feet in height of the side plates ..	7-16 inch thick
The next 5 feet in height of the side plates ..	3-8 inch thick
The next 10 feet in height of the side plates	5-16 inch thick
The top 20 feet in height of the side plates	1-4 inch thick

The contract for building the stand pipe was given to the Hodge Boiler Works of East Boston, who carried it out in a thoroughly satisfactory manner.

The stand pipe rests upon a foundation of rubble and concrete masonry. The foundation was built under contract by John Roach of Haverhill, and was well and thoroughly done.

The top of the stand pipe is about 290 feet above mean low tide at Merrimac port, or about 185 feet above the square. It has a wooden roof built under contract by Kelly Brothers. The stand pipe is connected with the pumping station by a telemeter, or recording gage, which records the heights of water on a chart and dial at the station. The charts give a complete record of the height of the water in the tank at all times, and can be filed away for reference.

The excavation for the stand pipe foundation was started May 12th, and the stand pipe was completed, ready for water, about the middle of August.

PUMPING MACHINERY.

The pumping machinery consists of one compound, condensing, duplex pumping engine, of a capacity of 1,250,000 gallons in 24 hours, and one "Underwriters" fire pump of a capacity of 1,000,000 gallons in 24 hours, with the necessary heaters and condensers, air and feed pumps.

There are two horizontal, tubular boilers, each 72 inches in diameter and 15 feet and 4 inches long, with one hundred and

forty 3-inch tubes 14 feet long. These boilers are also used to supply steam for the electric lighting engine, and each one of the boilers will furnish steam to run the main pump and the electric engine simultaneously, except in the time of the maximum load on the lighting plant.

The pumping machinery was furnished by the Deane Steam Pump Company of Holyoke. The entire plant, except boilers, was furnished and erected by the contractor upon foundations furnished by the Commissioners.

The compound pumping engine is designed to do all of the regular pumping. The high pressure, or Underwriters pump, is for emergencies, or to be used while repairs are being made to the main pump. It is not economical in the use of fuel, but its first cost was small, and, as it will be used but little, it serves the purpose of a supplementary pump as well as a more expensive one.

The boilers were furnished and set up by the Scannell Boiler Works of Lowell upon foundations furnished by the Commissioners.

Both the boilers and the pumping machinery were found upon completion to meet all of the requirements of the contracts and specifications, and seem to be excellent specimens of machinery of their type.

The pumps were tested on the 24th day of November, 1904. It was necessary to test them on Sunday, when the operation of the electric lighting plant could be suspended, in order that the boiler could be used exclusively in running the pumps. They met all the requirements of the tests prescribed in the contract.

The following gives the record of the duty test and its results.

The contract requirement in this respect was that the main pump and its auxiliary pump, including the boiler feed pump, should have a "duty of fifty million foot pounds," which means that for each 1000 pounds of steam taken from the boiler the plant should do useful work in pumping water equivalent to 50,000,000 foot pounds.

The test was made under the direction of Mr. H. M. Chase,

representing the Deane Steam Pump Company, and of the writer, representing the Water Commissioners.

Duration of test, 5 hours.

Total revolutions of pump,	8,919.
Total average lift in feet,	248.28
Average length of stroke in inches,	18.
Displacement per revolution in cubic feet,	3.927
Displacement per revolution in gallons,	29.38
Displacement per revolution in pounds,	244.73
Total number of gallons pumped,	262,040.
Total number of pounds,	2,182,793.
Less 1 1-2 percent for slip in pump,	32,742.

Net weight of water pumped, 2,150,051.

Total number of foot pounds equals 2,150,051 lbs. x 248.28 feet, equals 533,814,662 foot pounds.

Total steam consumed in pounds, 11,078

*Less excess used for air pump, 842

Total used in pumping, 10,236

533,814,662 ft. lbs.

Duty equals $\frac{533,814,662 \text{ ft. lbs.}}{10,236 \text{ lbs. steam}}$ equals 52,150,000.

*The contract provided that the machinery should, as part of its work, handle a volume of air from the well system equal at atmospheric pressure to 1 percent of the volume of water pumped.

Air is always found in driven well supplies, and is separated from the water by an air chamber on the suction pipe, from which it is pumped by an air pump and not allowed to enter the main pump.

In this plant, for some reason not yet ascertained, there was a very large amount of air, equal in volume to 5 percent of the water pumped, or five times as much as the contract provided that the machinery should handle. To pump this air required steam, and any excess of air required additional steam which should not be included in the amount used for the purpose of running the plant. Tests were made to ascertain the

amount of air being pumped and the amount of steam being used to pump the excess, and such amount was deducted from the total steam taken from the boilers, as above.

Water was pumped into the stand pipe and the piping system filled August 30th, or less than four months from the time the construction was started. The work of connecting the houses was begun about two weeks later.

The service pipes are of 1-inch wrought iron pipe lined with cement to $3\frac{1}{4}$ of an inch, inside diameter. The pipe was lined and the service pipe laid by day work under the direction of the superintendent of the works. The applications for water came in very slowly, and it was late in the season before a sufficient number were received to justify an attempt to let the work by contract.

METERS.

The town is to be congratulated upon the adoption by the Water Commissioners of a general system of metering the water. Every consumer is supplied with a meter. If there is one fact that is well established in water works practice, it is that the general use of meters results in a great saving in the consumption of water. It is equally well known that this saving is made by the prevention of waste of water, and not by curtailment of any legitimate use.

The meter system works automatically to prevent the running of water to prevent the freezing of pipes in cold weather, the continuous and useless running of hose in dry weather, and the continued maintenance of leaky plumbing fixtures in the houses.

I believe that there has never been a complaint that the meter system caused a restriction of use of water, or an excessive charge for its use, in places where it has been adopted. In spite of this, however, there is an unexplained and almost mysterious opposition to the introduction of meters among many people. It is, therefore, a matter of satisfaction when any system adopts them, for it not only prevents large future expenditures for construction and maintenance for that place, but is one more object lesson to show the results to be obtained by the general use of meters.

FIRE PROTECTION.

The system provides excellent fire protection. The stand pipe alone will furnish six or more good fire streams at any point along Main street, and I believe that there is no point in town, except at one or two dead ends, where four or more good streams will not be available. With the pump in operation ten or more good streams can be drawn at any point on Main street, and, with the exception of the dead ends above noted, five or more streams will be available in other parts of the town.

Having the pumping machinery located in the same building with the electric lighting plant makes it possible to start the pump at very short notice at any time, day or night, as steam is always on the boilers. This is no small advantage, which is due to having both plants in the same building and under the same management. The stand pipe is at one end of the system, and the pumps at the other, and a break in the main line would not necessarily cut off either portion of the system from the service. It is difficult to see how the fire service could be improved for a place of this size and character of buildings.

The entire work of constructing the system went on without any serious difficulties, and on the whole in a prompt and satisfactory manner. This result is largely due to the careful attention given to the work by Mr. Everett D. George, who acted as inspector on the pipes and the construction of the piping system.

Mr. Lewis D. Thorpe was engineer in charge of the construction of the entire system, and the smoothness with which the work progressed, and the freedom from accidents and mistakes, are due to his energy and painstaking attention to details.

I wish to express my thanks to your Board for its ready support and hearty co-operation in the execution of this work, and to recognize the pleasant relations between the Board and the engineering force at all times.

Respectfully submitted,

FREEMAN C. COFFIN.

MERRIMAC WATER WORKS

DETAILS OF PIPE SYSTEM.

January 17, 1905.

FREEMAN C. COFFIN, Civil and Hyd. Eng., Boston, Mass.

STREET	LOCATION		PIPE				GATES				Hydrants.	6 in. Pipe Hydrant Branches.	4 in. Pipe Blow Off	SPECIAL CASTINGS.														
	FROM	TO	12 in.	10 in.	8 in.	6 in.	12 in	10 in	8 in.	6 in.				8	II	12	13	16	22	30	32	34	40	44	46	58		
Adams street	Union street	Locust street				796				1	I	7									2							
Bartlett street	School street	Mill street				770				2	I	8									2							
Broad street	Merrimac street	Pleasant street				388				2	I	8									2							
Central street	School street	Green street				655				1	I	6									2							
Church street	Main street	Nichols street				2462				1	5	102									12							
Field Line	Pumping Station	Main street		887					1		I	23													I			
Field Line	Stand Pipe	Main street	743						1																			
Forest street	Main street	Grove street				627				1											I							
Green street	Locust street	School street				918				2		2	20								3							
Grove street	Forest street	Church street				1620				2		2	19								3	I						
High street	School street	Merrimac street		1600	469				1	3	4	34								I	2		4					
Liberty street,	Main street	Depot				798				1		2	17								3							
Lincoln street	Winter street	Summer street				677				2	I	7									3							
Little's Court	Main street	End of Pipe				250					I																	
Locust street	Main street	Walnut street				1535				2	I	27									6							
Locust Grove Ave.	School street	Walnut street				265				1	I	8									2							
Main street	Pumping Sta. Line	School street		5005					3	5	I	8	76	30							I	12	I					
Main street	School street	Stand Pipe Line	2978	1059				3	I	2	I	7	94	20							I		6		1	10	I	
Maple street	Summer street	Church street				685				I		I	7								I							
Mechanic street	Church street	Liberty street				331				2																		
Merrimac street	High street	West				804				I		I	8								I							
Merrimac street	High street	East				2286				3	I	4	47	10	I	8												
Middle Street	Locust street	School street				966				2		I	9								2							
Mill street	School street	Main street				1950				2	I	2	25	15	I	2												
Nichols street	Church street	Sawyer street				1072				I	I	2	13	30	I	3												
Pine street	Church street	Sawyer street				1020				3		2	16							4	I							
Pleasant street	School street	Locust street				912				2		2	17							3								
Pleasant street Pt	Broad street	High street				714				I		I	9								I							
Prospect street	Winter street	Church street				1462				4										I	I							
Prospect Hill	Main street	End of Pipe				293				I		I	6								I							
School street	Main street	High street		1956	1700			1	2		4	60			2	9				5								
Summer street	Grove street	Maple street				1347				2		3	17							5								
Union street	Main street	Adams street				184				I																		
Vendome street	Summer street	Woodland street				603				2										I								
Walnut street	Locust street					318				I		I	8							I								
Winter street	Vendome street	Prospect street				600						2	60							4								
Woodland street	Main street	Vendome street				1106				2		I	9							I								
Hydrant Branches and Blow Offs						767							767	105														
TOTALS				3721	6951	3556	31350	4	5	2	61	5	67	105	3	3	91	1	3	9	1	18	I	I	I	10	I	

Total length of Pipe, 45,683 feet—8.652 miles.

T 6x6x4 Reducer 8x6 T 6x6x6 Reducer 12x10 Cross 6x6x6x6 T 8x8x6 T 10x10x4 T 10x10x6 Cross 6x6x6x6 T 10x10x10 T 12x12x4 T 12x12x6 T 12x12x12

*Table giving the Elevation above the Sea at the Nozzle
of each Hydrant, and also the Head in Feet and
Pressure in Pounds at the Same Point,
when the Standpipe is Full.*

	Elevation of Nozzle of Hyd't.	Head in Feet Static.	Pressure in Pounds Static.
Top of Stand Pipe,	290.50	0	0
Adams St. at T. Connell's,	125.29	175.20	76.1
Central St.,	103.52	186.98	81.2
Church and Grove Sts.,	99.30	191.19	83.4 St.*
Church and Mechanic Sts.,	100.29	190.20	82.6
Church St. opp. J. B. Judkins',	109.37	181.12	78.7
Church St. and Railroad Ave.,	112.33	178.16	77.4 St.
Church St. opp. Sheridan's,	112.29	178.20	77.4
Church and Nichols Sts.,	111.05	179.44	78.0 St.
Green St. opp. Foster's,	105.5	184.99	80.3 St.
Grove St. by O. W. Little's,	109.9	180.59	78.4
Grove and Forest Sts.,	136.98	153.51	66.8 St.

Table of Elevations, etc., continued.

	Elevation of Nozzle of Hyd't.	Head in Feet Static.	Pressure in Pounds Static.
High St. by John Schofield's,	116.17	174.32	75.8 St.*
High and Pleasant Sts.,	103.37	187.12	81.2 St.
High and Merrimac Sts.,	60.51	229.98	99.8
Liberty and Mechanic Sts.,	98.42	192.07	83.5 St.
Liberty at End,	104.30	186.19	81.0
Lincoln St. by Geo. Judkins',	123.40	167.09	72.6
Little's Court,	108.77	181.72	78.9
Locust and Green Sts.,	111.20	179.29	78.0 St.
Locust Grove and Walnut Sts.,	81.57	208.92	90.7 St.
Main St., field line to Pump Sta.,	108.31	182.18	79.2 St.
Main St. by T. L. Goodwin's,	109.66	180.83	78.5
Main St. cor. Bear Hill St.,	119.54	170.95	74.3 St.
Main St. by Gunnison's house,	122.11	168.38	73.2 St.
Main St. by Universalist Church,	123.03	167.46	72.8 St.
Main St. cor. Mill St.,	93.95	196.54	85.3 St.
Main St. by Power House,	87.29	203.20	88.2 St.
Main St. cor. Liberty St.,	95.41	195.08	84.8 St.
Merrimac Sq.,	107.84	182.65	79.2 St.
Main St. and Little's Court,	109.59	180.90	78.5 St.
Main and Locust Sts.,	119.99	170.50	74.1 St.

Table of Elevations, etc., continued.

	Elevation of Nozzle of Hyd't.	Head in Feet Static.	Pressure in Pounds Static.
Main and Forest Sts.,	126.69	163.80	71.20
Main and Union Sts.,	137.06	153.43	66.7 St.*
Main St. near Harry Hale's,	154.75	135.74	59.0
Main St. by E. C. Little's,	166.24	124.25	54.0 St.
Maple St. near Summer St.,	110.89	179.60	78.0
Merrimac St., West End,	23.20	267.29	116.0 St.
Merrimac St. near Broad St.,	26.66	263.83	114.4
Merrimac St. near bridge,	19.23	271.26	117.6
Merrimac St. near Water St.,	20.56	269.93	117.0
Merrimac St., East End,	95.49	195.0	84.7 St.
Middle St. cor. Locust St.,	107.45	183.04	79.5
Mill St. near Corporation,	63.51	226.98	98.6 St.
Mill St. cor. Bartlett St.,	57.83	232.66	102.0
Nichols St. by Gorton's,	111.85	178.64	77.7 St.
Pine and Sawyer Sts.,	113.24	177.25	77.0
Pine St. by Moser's house,	108.53	181.96	79.0
Pleasant St. Pt. by Engine House,	65.43	225.06	97.7
Pleasant St. Pt. corner Broad,	41.03	249.46	108.5
Pleasant St. corner Locust,	106.18	184.31	80.1 St.
Pleasant St. near Vale,	101.94	188.55	81.9

Table of Elevations, etc., continued.

	Elevation of Nozzle of Hyd't.	Head in Feet. Static.	Pressure in Pounds Static.
Prospect Hill,	141.44	149.05	65.0 St.*
Pumping Station,	110.04	180.45	78.5
School St. opp. Town Hall,	109.71	180.78	78.5
School St. by Engine House,	104.36	186.13	80.8
School St. cor. Green,	105.41	185.08	80.5
School St. cor. Bartlett,	88.14	202.35	87.8
School St. cor. Middle,	73.85	216.64	94.1 4w'y
School St. cor. Mill,	64.91	225.58	98.0 St.
School, Broad and High Sts.,	73.16	217.33	94.4
Summer and Prospect Sts.,	103.84	186.65	81.0
Summer, betw'n Vendome-Linc'n,	115.05	175.44	76.2
Summer St. cor. Grove,	122.41	168.08	73.0
Walnut St. cor. Locust,	115.03	175.46	76.2 St.
Winter and Prospect Sts.,	137.29	153.20	66.7
Woodland and Vendome Sts.,	129.03	161.46	70.3 St.
Woodland St. by J. H. Cleary's,	125.21	165.28	71.8

* St. stands for steamer nozzle.

WATER RATES.

All water consumers will be furnished with water through meters, and the following rates will be charged:

For 10,000 cubic feet or less annually to one customer, per 100 cubic feet, 25 cents.

For more than 10,000 and less than 20,000 cubic feet annually, per 100 cubic feet, 20 cents.

For more than 20,000 and less than 50,000 cubic feet, per 100 cubic feet, 15 cents.

No water will be turned on to any premises, except upon the payment of a yearly minimum charge of \$6.00.

This will entitle the customer to use water at meter rates through faucets for all purposes except as specified below.

For use in water closets there will be an additional yearly charge of \$5.00. This will entitle the consumer to use water at metered water rates through water closets and urinals of all kinds.

For use in bath tubs an additional yearly charge of \$4.00. This will entitle the consumer to the use of water at metered rates in bath tubs.

For use of water through hose an additional yearly charge of \$5.00. This will entitle the consumer to the use of water at metered rates through hose for all purposes, including sprinklers, fountains and troughs.

The above minimum charges cover the use of water by one family or consumer at metered rates for all of the purposes for which the water is supplied by the system. No further charge will be made until the amount of water used in any quarter exceeds at meter rates the amount of the minimum charges paid for that quarter.

Any consumer paying minimum charges amounting to \$20.00 per annum will be entitled to the use of water at meter rates for all purposes without regard to the fixtures in use.

The minimum charges must be paid quarterly in advance within 15 days of date of bill.

Bills for water in excess of minimum charges will be sent out at the beginning of each quarter for the preceding quarter and must be paid as above.

The department will provide, set and keep in repair the meters, except where they are injured by freezing, or by the neglect or carelessness of the consumer, when it will repair or replace them at the expense of the consumer. They will remain the property of the department, and the consumer shall provide and maintain a suitable place for them of easy access for reading and inspection.

REGULATIONS OF THE MERRIMAC WATER WORKS.

The following regulations, until further notice, shall be considered a part of the contract with every person who uses the water:

1. All applications for the use of water must be made at the office of the Water Commissioners, and state fully the purposes for which it is intended to be used, and be signed by the owner of the premises to be supplied, or by his duly authorized agent. The town will in all cases furnish and lay the service pipe from the street main to and through the cellar or basement wall, and provide on the end thereof a stop and waste valve, and the owner of the premises shall in all cases pay for that portion of such service pipe as may be laid beyond the line of the street, together with the expense of laying the same, and stop and waste valve.

2. All applicants for whom the water is laid will be charged for the use of one faucet whether the water is used or not; and in no case will the main be tapped more than once for the same premises, unless the additional expense is borne by the owner. All bills for piping must be paid before the water is turned on.

3. All persons using the water must furnish internal pipes, connections and all fixtures; and must keep them in good repairs and protected from frost at their own expense, and the town will not be liable for any damage resulting from their failure to do so.

4. No person will be permitted to insert or cause to be inserted, any faucet in any water pipe, or connect any service pipe for conveying the water from any of the main or distributing pipes to any house, building or manufactory, or for any purpose whatever, without the written permission of the Water Commissioners, or their duly authorized agent; nor shall any addition to, alteration of, any water pipe or faucet be made without such written permission.

5. In all cases of non-payment of water rates for thirty days after the same are due, the water will be shut off, and not let on again until the amount due and two dollars for the shutting off and letting on are paid.

6. When the water is supplied to more than one party through a single tap, the water may be shut off in case of non-payment of either party, notwithstanding one or more of the parties may have paid his or their amount due.

7. Owners of premises will be held responsible for the water rates of their tenants.

8. No water taker shall supply the water to parties not entitled to its use, except by written permit.

9. The Water Commissioners or their agent, shall have free access to all premises supplied with water, to examine the pipes and fixtures, and to ascertain the quantity of water used and the manner of its use; and all pipes and fixtures shall be subject to rejection by said Board if considered unsuitable for the purpose.

10. No person nor persons shall in any case be allowed to open any fire hydrant except by a written permit from the Water Commissioners. But the Chief Engineer of the Fire Department shall in all cases have control of hydrants at fires and for practice.

11. The Commissioners reserve the right to restrict the use of hose or fountains, to shut off the water in all cases when it becomes necessary to make extensions or repairs, or for violations of any of the regulations; or to put in meters for the purpose of measuring the quantity of water used. When the supply is shut off for the violation of any of these regulations, the water will not be let on again until the sum of two dollars for shutting off and letting on the water is paid.

12. It is sometimes necessary to shut off water in the street mains to make repairs when there is not time to give notice of such shutting off, and if the water ceases to flow from this or any other cause, all persons having any fixture liable to injury from the sudden withdrawal of water are hereby notified that the town is not responsible for damages in any such case.

13. Persons using the water for domestic or manufacturing purposes may erect hydrants on their grounds to be used only in case of fire, without additional charge for the water.

COMMONWEALTH OF MASSACHUSETTS. STATE BOARD OF HEALTH.

MERRIMAC WATER ANALYSIS. (Parts per 100,000)

Number	Date of Collection	APPEARANCE		AMMONIA		NITROGEN AS		Iron
		Turbidity	Sediment	Free	Albu-mi-noid	Chlorine	Nitrites	
48171	Nov. 20	1903.	None.	.00	4.60	.0006	.0000	.0080
48170	Nov. 20	None.	None.	.00	5.20	.0004	.0000	.0130
48186	Nov. 21	None.	None.	.00	5.60	.0010	.0008	.0050
48187	Nov. 21	None.	None.	.00	4.60	.0008	.0016	.0030
48200	Nov. 22	None.	None.	.00	4.90	.0004	.0010	.0070
48201	Nov. 22	None.	None.	.00	4.40	.0006	.0012	.0050
48202	Nov. 23	None.	None.	.00	4.30	.0006	.0008	.0030
48258	Nov. 24	None.	None.	.00	4.70	.0016	.0018	.0030
48259	Nov. 25	None.	None.	.00	4.70	.0010	.0006	.0030
48272	Nov. 26	None.	None.	.00	4.10	.0012	.0020	.0050
48273	Nov. 27	None.	None.	.00	4.20	.0012	.0016	.0050
48294	Nov. 28	None.	None.	.00	5.50	.0000	.0006	.0050
48295	Nov. 29	None.	None.	.00	4.90	.0000	.0004	.0030
48318	Nov. 30	None.	None.	.00	4.40	.0006	.0016	.0030
48317	Dec. 1	None.	None.	.00	4.90	.0006	.0020	.0050
48341	Dec. 2	None.	None.	.00	4.60	.0012	.0008	.0080
48342	Dec. 3	None.	None.	.00	4.40	.0010	.0008	.0050

The samples were collected while pumping continuously from a group of 16 tubular wells at a rate of 300,000 gals. a day.

TREASURER'S REPORT.

CLIFTON B. HEATH, TOWN TREASURER, IN ACCOUNT
WITH WATER DEPARTMENT.

1904.	DR.	
Apr. 25	Jose, Parker & Co., temporary loan, \$5,000 00	
June 27	Jose, Parker & Co., temporary loan, 5,000 00	
July 15	Merrill, Oldham & Co., for water bonds, 84,000 00	
	Merrill, Oldham & Co., premium	
1905.	on water bonds, 4,610 76	
Jan. 1	Interest on bank deposit, 309 23	
Feb. 6	Received from Water Board to date, 1,559 22	
		————— \$100,479 21
1904.	CR.	
April 27	Interest on note for temporary loan, 46 75	
June 27	Interest on note for temporary loan, 13 33	
July 25	Note of April 25, 1904, 5,000 00	
27	Note of June 27, 1904, 5,000 00	
Aug. 25	Loan, Town of Merrimac, 5,000 00	
Oct. 6	Loan, Town of Merrimac, 5,000 00	
Nov. 3	Loan, Town of Merrimac, 5,000 00	
1905.		
Jan. 15	Interest on water bonds, 1,680 00	
	Miscellaneous orders of Water Board, 73,217 49	
	Balance on deposit, 521 64	
		————— \$100,479 21

Respectfully submitted,

CLIFTON B. HEATH, Treasurer.

Merrimac, February 20, 1905.

ELECTRIC LIGHT REPORT, TOWN OF MERRIMAC.

REPORT OF THE MUNICIPAL LIGHT BOARD.

To the Citizens of the town of Merrimac :

The Municipal Light Board herein present their first annual report, showing the expenditures of money, under a vote of the town to construct a Municipal Light and Power Plant.

The Commissioners organized by choosing E. D. George, chairman, and William L. Smart, secretary. After talking with several electrical engineers, we finally employed James Dickens as our consulting engineer, and after looking at the different systems, we decided to install the incandescent street light system, as we could distribute the light more evenly, and it was not as expensive to install or maintain as the arc system.

You will see by the preliminary report that Mr. Swan estimated about \$11,000 to install the street lighting system, and Mr. Dickens also estimated about that amount, and we should have kept well inside the amount that was appropriated by the town if we had not installed the power and commercial lighting ; but as soon as the street lights were turned on, October 5, we began to receive applications for power and

light; therefore we thought it would be for the best interests of the town to make an overdraft and install them as we received applications, which made an extra expense for wire, transformers, meters, and labor on construction, \$2,852.67, which made an overdraft of \$2,062.96. And we shall receive for what we have installed for the ensuing year about \$1,000 for power and about \$1,200 for lights, making a total of \$2,200. We have set at the present time 401 poles and 315 incandescent lights, and if the town should make an appropriation of \$6.50 per light which would make \$2,047.50, and the \$2,200 received from power and light, would make a total of \$4,247.50, which would be sufficient to run the plant and install several light services, as all services installed are a great help in maintaining the plant. Electric current is supplied in J. B. Judkins & Sons, and J. A. Lancaster & Co.'s factory, and there are forty commercial light takers which are all metered. We shall be better able to make a report on the cost of maintenance of the plant after it has been in operation a year.

We consider ourselves fortunate in securing the services of Mr. Dickens, as the work has been done in a very satisfactory manner, and he has given the town a lighting plant that we feel safe in saying is approved of by all of the citizens of the town.

BONDS.

Bids were received for \$11,000 four per cent. light bonds as follows:

Lawrence Barnum & Co.,	100.89
Jose, Parker & Co.,	102.25
E. H. Rollins & Sons,	102.91
Geo. A. Fernald & Co.,	103.04
Blake Brothers & Co.,	103.54
N. W. Harris & Co.,	104.87

Estabrook & Co.,	105.037
Blodget, Merritt & Co.,	105.047
R. L. Day & Co.,	105.353
Merrill, Oldham & Co.,	105.489

Merrill, Oldham & Co. were awarded the bonds at 105.489, the premium amounting to \$603.79.

Following is a list of the bids received on electrical goods, financial report, a copy of the rules and regulations, and the Engineer's report:—

Bids received and opened on electric works, April 16, 1904.

- Item No. 1, Engine.
- Item No. 2, Generator.
- Item No. 3, Station wiring.
- Item No. 4, Belts.
- Item No. 5, Transformers.
- Item No. 6, Line Construction.

ITEM NO. 1.

Ames Iron Works,	\$1,190.00
Harrisburg Foundry Co.,	{ 1,475.00
bid on two engines,	{ 1,750.00
Mackintosh & Seymour & Co.,	1,400.00
Jarvis Engineering Co.,	
Ball & Wood,	2,038.00
Skinner Engine Co.,	1,280.00
Ridgeway Dynamo & Engine Co.,	1,175.00
Bellman & Sanford,	{ 1,116.00
bid on three engines,	{ 1,603.00
	{ 1,803.00

The contract on engine was awarded to the Ridgeway Dynamo & Engine Co.

ITEM NO. 2.

Stanley Electric Co., bid on three generators,	{ \$2,091.00 2,346.00 3,844.00 2,165.00
Bullock Electric Manufacturing Co.,	
Westinghouse Electric Manufacturing Co., in- cluding Item No. 5,	
Warren Electric Manufacturing Co.,	2,591.00
National Electric Manufacturing Co.	1,897.50
Bellman & Sanford, bids on three generators,	2,265.00
The General Electric Co.,	{ 1,700.00 1,950.00 2,895.00 2,473.00

The contract was awarded to the Westinghouse Electric Manufacturing Co.

ITEM NO. 3.

Bellman & Sanford,	\$190.00
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The contract on this item was not let, as we thought it would be more satisfactory to do it by day labor, and Bellman & Sanford would not take this item unless they had item No. 6.

ITEM NO. 4.

Bellman & Sanford,	\$75.00
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They did not want this item unless they had others, so we bought our own belts.

ITEM NO. 5.

Pettingell, Andrews Co.,	\$286.56
Fort Wayne Electric Co.,	268.50
Warren Electric Manufacturing Co.,	299.25

Bellman & Sanford,	260.00
C. S. Knowles,	367.00
Packard Electric Co.,	{ 265.32
	{ 324.00
Westinghouse Electric Manufacturing Co., including Item No. 2,	2,591.50

This contract was awarded to the Westinghouse Electric Manufacturing Co., with Generator.

ITEM NO. 6.

Lord Electric Co.,	\$8,300.00
Bellman & Sanford,	6,533.00

This contract was not awarded as our engineer, Mr. Dickens, thought it would be more satisfactory to do it by day labor, which has proved to be the case.

COPPER WIRE.

The following bids were received on copper wire:—

	PER LB.
The Ansonia Electrical Co.,	13½ cents
Stuart Howland Co.,	13¼ cents
National Conduit & Cable Co.,	\$13.40 per 100
Pettingell Andrews Co., No. 4,	13¾ cents
Pettingell Andrews Co., No. 6,	13¾ cents
Pettingell Andrews Co., No. 10.,	14¾ cents
C. S. Knowles,	13 cents

The contract was awarded to C. S. Knowles. The above prices were given on immediate shipment, and we purchased enough to install our street light system.

POLES.

The following bids were received on Poles:—

Pettingell Andrews Co., 35 ft. 7 in. top,	\$3.50 f.o.b.m.
Pettingell Andrews Co., 30 ft. 7 in. top,	2.50 "
Pettingell Andrews Co., 30 ft. 6 in. top,	2.00 "
Stuart Howland Co., 35 ft. 7 in. top,	3.75 "
Stuart Howland Co., 30 ft. 6 in. top,	2.15 "
J. H. Chesley & Co., 35 ft. 7 in. top,	2.95 f.o.b.
J. H. Chesley & Co., 30 ft. 7 in. top,	2.45 "

The contract was awarded to Pettingell Andrews Co. In addition to the poles furnished by the above firm, we purchased some extra ones of G. W. Sargent Sons and R. C. Morrill.

FINANCIAL ACCOUNT.

ENGINE.

Ridgeway Dynamo and Engine Co., on ac-	
count of engine,	\$783 32
	<hr/>
	\$783 32

GENERATOR AND TRANSFORMERS.

Westinghouse Electric Mfg. Co., generator	
and transformers as per contract,	\$2,591 00
W. H. Emerson, hauling generator and sup-	
plies,	12 00
	<hr/>
	2,603 00

MATERIAL AND LABOR FOR STATION INSTALLATION.

James Dickens, wire and fixtures,	\$80 66
The Taylor-Goodwin Co., lumber for gen-	
erator foundation,	3 20
James Dickens, supplies,	33 59
Kelley Brothers, stock and labor on founda-	
tion,	52 46
James Dickens, labor of self and man,	129 43
C. R. Sargent, stock and labor piping engine,	109 54
C. W. Trainer Mfg. Co., covering steam pipes,	25 85
E. W. Roberts, labor setting switch board,	4 15
	<hr/>
	438 88

BELTS.

C. A. Schreiner Co., two belts,	\$79 04

	\$79 04

LINE CONSTRUCTION SUPPLIES.

C. S. Knowles, 15,671 lbs. wire and reels,	\$2,140 73
James Dickens, 2,320 lbs. wire,	319 60
" 933 lbs. wire,	138 59
" 967 lbs. wire,	145 80
" 669 lbs. wire,	73 59
Pettingell Andrews Co., 377 chestnut poles,	654 94
R. C. Morrill, 21 cedar poles,	45 00
G. W. Sargent Sons, 13 cedar poles,	32 50
C. S. Knowles, 1,107 cross arms,	143 53
" 800 galv. cross arm braces,	100 73
" 3,000 locust pins,	25 65
Pettingell Andrews Co., light fixtures,	611 55
" " tools, wire, bolts, etc.,	142 72
American Electric Works, 598 lbs. wire,	78 32
" " wire,	122 75
James Dickens, 500 16 c. p. lamps,	80 00
" supplies,	140 08
Boston Electric Co., supplies,	16 25
I. B. Little Co., 2 bbl. paint,	92 70
" tools and supplies,	79 12
James Dickens, one oil switch,	19 28
" 1 transformer, 2 k. w.,	32 04
" 2 transformers, 4 k. w.,	116 64
" 6 transformers, 5 k. w.,	324 00
" 2 transformers, 10 k. w.,	235 82
" 15 meters, 5 amp.,	169 78
" 24 meters, 10 amp.,	304 03
" 4 meters, 20 amp.,	89 79
" 1 meter, 80 amp.,	55 44

	6,530 97

LABOR ON LINE CONSTRUCTION.

John Waters, labor shaving poles,	\$15 00
Wm. McCarthy, "	12 00
Wm. Avery, "	14 45
R. A. Young, "	1 39
E. C. Webster, "	31 34
W. H. Scott, "	27 36
H. P. Davis, "	22 91
A. W. Sawyer, "	13 58
John Waters, labor on line work,	53 31
E. Lumburg, "	325 30
Wm. Avery, "	352 60
W. S. Tuckwell, "	207 21
Ernest Hopkins, "	124 46
James Boyle, "	149 44
James Murphy, "	58 75
Wm. O'Brien, "	52 56
E. Wall, "	25 63
John Handley, "	25 33
D. Berry, "	50 71
H. Evans, "	44 44
J. Doyle, "	35 33
T. Gammon, "	123 61
J. Tapin, "	99 63
L. Dickens, "	39 45
B. Crowley, "	2 40
R. Olin, "	2 40
James Dickens, labor and traveling expenses,	101 39
C. S. Little, team on construction,	35 00
W. H. Emerson, unloading poles and hauling poles and wire,	50 70
James Dickens, labor,	61 20
G. G. Davis, team on construction,	137 74
James Dickens, labor,	179 05
P. Maloy & Son, blasting for holes,	39 14
	<hr/>
	\$2,514 81

FREIGHT AND EXPRESS.

Bion Green, freight on supplies,	\$12 48
" freight on car of poles,	63 90
" freight on car of poles,	61 20
" freight on three cars of poles,	140 79
" freight on cross arms,	89 17
" freight on car of poles,	45 00
" freight on supplies,	4 33
" freight on fixtures,	4 61
American Express Co., express on reostart,	4 50
" " express on supplies,	50
	—————
	\$426 48

CONSULTING ENGINEER.

James Dickens, consulting engineer,	\$350 00
	—————
	\$350 00

MISCELLANEOUS.

Merrimac Budget, order book,	\$13 00
" printing specifications,	27 50
" application blanks, etc.,	11 50
" printing and record book,	28 00
Bailey Sargent, premium on insurance policy on help,	75 00
Carriage Wheel & Gear Co., stakes,	3 00
The Forbes Lithograph Mfg. Co., printing electric light bonds,	90 00
H. H. Story, telephoning and supplies,	9 96
Allen Doane, stencil,	4 85
W. L. Smart, tracing paper for map,	1 09
Frank Anderson, sharpening tools,	85
F. E. Pease, making map for electric light system,	15 00
	—————
	\$279 75

MAINTENANCE.

James Dickens, two barrels oil,	\$45 98
" repairs on exciter,	14 86

	\$60 84

BALANCE DUE ON CONTRACTS AND THE TOWN.

Ridgeway Dynamo and Engine Co., balance	
due on engine,	\$391 68
Town, interest on bonds,	220 00

	\$611 68

BALANCE SHEET.

RECEIPTS.

Electric light bonds,	\$11,000 00
Premium on bonds,	603 79
Credit on reels,	95 58
Credit on insurance premium,	21 25
American Express Co., error on express charge,	4 50
Income from commercial lights,	279 28
*Overdrawn,	2,062 69
	—————
	\$14,067 09

EXPENDITURES.

Engine	\$783 32
Generator and Tranformers,	2,603 00
Material and labor for station installation,	438 88
Belts,	79 04
Line construction supplies,	6,530 97
Labor on line construction,	2,514 81
Freight and express,	426 48
Engineer,	350 00
Maintenance,	60 84
Miscellaneous,	279 75
	—————
	\$14,067 09

Due from Town, acct. of street lighting,	\$230 28
Due for power to Jan. 31,	253 59
Supplies on hand:	
2 transformers,	69 00
2 meters,	25 20
689 lbs. wire at .14,	96 46
1200 feet cross arms,	48 00
6 street fixtures,	10 80
Braces, pins and supplies,	25 00
	—————
	\$758 33
Balance due Ridgeway Dynamo and Engine Co., on engine,	\$391 68
Due Town, interest on electric light bonds,	220 00
	—————
	611 68
	—————
	\$146 65

* Through an error an order for \$21.64 was drawn on the light funds which should have been paid by the water department and on this account there is a discrepancy of this amount from the balance shown in the Treasurer's report.

EVERETT D. GEORGE,
FRANK E. PEASE,
WILLIAM L. SMART, } Municipal
 } Light Board.

Merrimac, February 20, 1905.

ENGINEER'S REPORT.

MR. EVERETT D. GEORGE,

MR. FRANK E. PEASE,

MR. WILLIAM L. SMART,

Municipal Light Board, Town of Merrimac, Mass.

Gentlemen:—Agreeably to your request for a report on the electric plant, I beg leave to report briefly as follows:

I was directed to prepare specifications for a complete plant that would be best suited to the local conditions, and after a careful study of your particular needs and "the present state of the electrical art," plans and specifications were prepared and delivered to the bidders on April 15, resulting in the following apparatus being obtained.

STEAM ENGINE.

The engine is the centre crank type, with automatic inertia governor, now set to maintain a speed of 255 rev. The steam cylinder is 12 in. bore x 14 in. stroke. This engine is very heavily built and is capable of carrying a very heavy overload without injury. The notable features of this engine are close regulation, the oiling system, accessibility, and rigidity. It is set on a concrete foundation 5 feet deep with a batter of 3 feet on all sides. The engine was furnished set up by the Ridgeway Dynamo and Engine Co., they being the lowest bidders to meet your specifications.

DYNAMO.

The electrical generator, exciter, switch-board, transformers, and detail appliances were furnished by the Westinghouse Electric Mfg. Co., they being the lowest bidders to meet your specifications.

The generator has a capacity of 75 kilo-watts (equal to 1500 16 c. p. lamps or its equivalent). It is the two bearing belted type with revolving field two phase 2200 volts 60 cycles 720 rev. per minute. It is specially designed for the operation of electric motors of the best type, lighting, heating and welding appliances. A very complete set of measuring instruments is provided with it. It has an overload capacity of 50% for one hour or 25% for 24 hours. Foundation is of concrete 4 feet deep with batter on all sides of 2 ft. 6 in.

DISTRIBUTION SYSTEM.

The street lighting is connected in parallel to transformers whose secondary wires are also connected in parallel. The lamps used are the regular staple 16 c. p. 3 1-2 watt lamps which gives a high efficiency with a minimum of expense and care. The street lamps are all run on one side or phase. Commercial lights are all run on the other phase. Motors are run on separate lines connected to both phases.

377 chestnut and 23 cedar poles are used for the support of lines. Poles on main line are 35 ft. long, set 6 ft. in the ground; all other poles are 30 ft. set 5 ft. in the ground. Angles are supported by guys. Cross arms are all North Carolina pine secured with 5-8 galvanized iron bolt and galvanized iron braces. For the greater safety of men working on these poles and wires, only wires of low potential are on pole pins; also each wire occupies the same pin throughout its entire length, not being changed from one pin to another as may be noted in other towns and cities, making it neces-

sary to change much wiring when it is necessary to increase the number of wires.

LOCATION OF TRANSFORMERS.

Street light transformers are located as follows:

One 1 k. w. near Bear Hill street, lighting Main from Station to near C. E. Gunnison's.

One 1 1-2 k. w. head of Mill on Main, lighting Main from C. E. Gunnison's to Liberty, Prospect hill, and Mill from Main to Bartlett.

One 1 1-2 k. w. corner Mechanic and Church, lighting Church from Prospect to Main, Main to Liberty, Grove to Summer, Mechanic, Liberty streets, and Railroad ave.

One 1 k. w. on Church street at ball grounds, lighting Nichols, Sawyer, Maple, Currier's court, and Church from Nichols to Prospect.

One 2 k. w. corner Summer and Prospect, lighting Prospect, Pine, Lincoln, Vendome, Summer and Winter.

One 2 k. w. corner Main and Woodland, lighting Woodland, Grove from Woodland to Summer, Locust from Main to Green, Main from Church to Forest, and Little's court.

One 1 1-2 k. w. corner Main and Orchard, lighting Main from Forest to Stand-pipe, Orchard, Grove to Woodland, Forest, Union and Adams.

One 1 k. w. corner of Central and School streets, lighting School from Main to Green, Green, Central and Lancaster court.

One 2 k. w. corner of Middle and School streets, lighting School from Pleasant to Mill, Mill to Bartlett, Bartlett, Pleasant, Middle, Locust from Pleasant to S. Goodwin's and Locust Grove street.

One 1 k. w. corner of Broad and High streets, lighting High from School to Pleasant street, Port, Broad from School to Pleasant street, Port, School from Broad to Mill street.

One 2 k. w. corner of Broad and Merrimac streets, lighting Merrimac, Water, Broad to Pleasant, Pleasant, High, Merrimac to Pleasant street.

Lamps, poles, street light transformers and wires are located as per plans on file in your office.

Transformers for commercial lighting are located as follows :

One 5 k. w. at S. C. Pease & Sons', lighting from Har- graves' house to Poyen block inclusive ; also Merrimac Plating Works and I. B. Little Co.

One 5 k. w. at Jordan house, lighting Z. Lovell & Co., Green street and School street, except I. B. Little Co.

One 5 k. w. at Sargent coal office, lighting Church from Main to house of E. D. George.

One 1 k. w. corner of Church and Pine streets, lighting house of Bion Green.

One 5 k. w. near Dr. Sweetsir's house, lighting Main from house of Robert Patten to near Woodland street.

One 5 k. w. near Orchard street, lighting house of Harry Hale.

On the above commercial lines there are set 40 watt meters.

Transformers for power only :

Two 10 k. w. transformers are located at works of J. B. Judkins & Sons Co.

Two 4 k. w. transformers are located at works of J. A. Lancaster & Co.

One polyphase watt meter is set in each place.

To make the necessary connections on the above there was used on the street light system 16,500 lbs. of wire; on the commercial and power system, 3,864 lbs.

The plant was started in operation on October 5th, 1904, and has been run in a very gratifying manner.

It has fulfilled every requirement called for or expected of it, especially along the line of efficiency. In the construction of this plant reliability and a minimum of operating expense were the features kept always in view. That you have succeeded is fully demonstrated in the experience of the past months.

In conclusion I have to thank you for the very polite consideration you have shown towards me during the installation of this plant; also I desire to thank all those citizens of Merrimac and others who so kindly rendered assistance during the prosecution of the work.

Respectfully submitted,

JAMES DICKENS, Engineer.

Newburyport, Mass., Feb. 6, 1905.

SCHEDULE OF LIGHTS.

Field Line to Lower Corner,	9
Lower Corner to Poyen Block,	31
Poyen Block to E. C. Little's,	27
Square, on Church street to Nichols street,	20
Nichols street,	5
Spring street,	2
Maple street,	5
Railroad avenue,	1
Pine street,	5
Prospect street,	11
Lincoln street,	5
Vendome street,	4
Grove street,	17
Summer street,	6
Woodland and Winter streets,	13
Forest street,	3
Orchard street,	2
Liberty street,	10
Mechanics street,	2
Prospect hill,	2

Little's court,	2
By town hall,	1
School street,	31
Locust street,	12
Adams and Union streets,	5
Central street,	2
Green street,	4
Pleasant street,	3
Middle street,	4
Locust Grove street,	2
Bartlett street,	3
Lancaster court,	1
Mill street,	8
High street,	16
Merrimac street,	25
Water street,	2
Pleasant street, Port,	4
Broad street,	10
	315

There were 401 poles set.

RULES AND REGULATIONS FOR THE USE OF ELECTRIC CURRENT.

1. Light or current will be charged for at the rate of twenty (20) cents per one kilowatt-hour which is approximately one cent per one sixteen candle-power lamp-hour. Power will be subject to special contract. Bills will be rendered monthly and are payable within thirty days from date of bill. Bills paid on or before the fifteenth inst. will be subjected to a discount of 25 percent.
2. A minimum charge of one (1) dollar per month will be made for light whenever the monthly bills as shown by the meter is less than that amount; except during the months of May, June, July and August when the minimum charge will be fifty (50) cents.
3. In the case of premises being vacated, notice of such vacancy shall be given to the manager forthwith, and bills for current supplied shall be rendered and become payable at the time of such vacancy.
4. In every case of non-payment of the electric light rate for thirty (30) days after the same is due, the Electric Light Commissioners shall cause a written demand to be served at the premises of the delinquent; and unless said rate is paid within ten days thereafter, together with twenty-five cents for the demand the supply shall be cut off. The current shall not be turned on until the amount due, together with twenty-five cents for said demand and one dollar for cutting off and turning on, is paid.
5. The customer shall be responsible for all current consumed until written notice of discontinuance of service shall have been given to the manager.
6. Meters will be furnished and installed free of charge and together with all other appliances not paid for by the customer, shall remain the property of the Electric Light Department.

7. All inside wiring and fixtures must be the property of the consumer, and all changes or repairs thereon must be made at his expense.
8. All overhead service or connections will be furnished and put up free of charge from the street to the first support, and where carried on poles across private grounds the owner will pay at cost for all poles and wire beyond the first support.
9. Underground service will be furnished and put in at cost.
10. There shall be no interference with the meter or any of the appliances used in supplying light or current under penalty of immediate discontinuance of service.
11. The Electric Light Board reserve the right to discontinue service without notice, and to remove its property from the premises of the customer, in case of non-payment of bills when over due or non-compliancy with any of the rules and regulations.
12. The Electric Light Board shall not be held responsible for any failure to supply light current, if failure is without willful default or neglect on its part.
13. Customers are not permitted to add more fixtures, lights or motors, or to make any changes in wires, nor to use the electric current for any purpose or in any place other than is provided for in application without first having obtained the consent of the Municipal Light Board.
14. The Department shall have free access to the premises for the purpose of examining the wires, meter, lamps and other appliances, or for the removal of the meter, or for the discontinuance of the current.

TREASURER'S REPORT.

CLIFTON B. HEATH, TOWN TREASURER, IN ACCOUNT
WITH ELECTRIC LIGHT DEPARTMENT.

1904	DR.
July 15	Merrill, Oldham & Co.,
	light bonds, \$11,000 00
	Merrill, Oldham & Co.,
	premium on light
	bonds, 603 79
	Rec. from Light Board, 400 61
	Overdraft, 2,084 33
	—————
	\$14,088 73

CR.

Paid miscellaneous orders of Light	
Board, 14,088 73	—————
	\$14,088 73

Respectfully submitted,

CLIFTON B. HEATH, Treasurer.

Merrimac, February 20, 1905.

AUDITOR'S REPORT.

I have examined the accounts of the Water and Light Departments for the fiscal year ending January 31, 1905, and find them both to be correct.

The statement below is the amount of orders drawn and paid as shown by the books..

Total orders drawn this year :

Water Dept.,	\$99,979 21
Light Dept.,	14,067 09
	<hr/>
	\$114,046 30

Total orders paid by Treasurer :

Water Dept.,	\$99,957 57
Light Dept.,	14,088 73
	<hr/>
	\$114,046 30

Through an error an order for \$21.64 was drawn on the light funds which should have been paid by the water department and on this account there is a discrepancy of this amount from the balance shown in the Treasurer's report.

Vouchers are on file for all bills paid, and I hereby certify that the accounts are correct.

HARLAND G. LITTLE, Auditor.

Merrimac, Mass., February 21, 1905.

MAP
of
PIPING SYSTEM

Showing.

Merrimac Water Works

NOV 1904

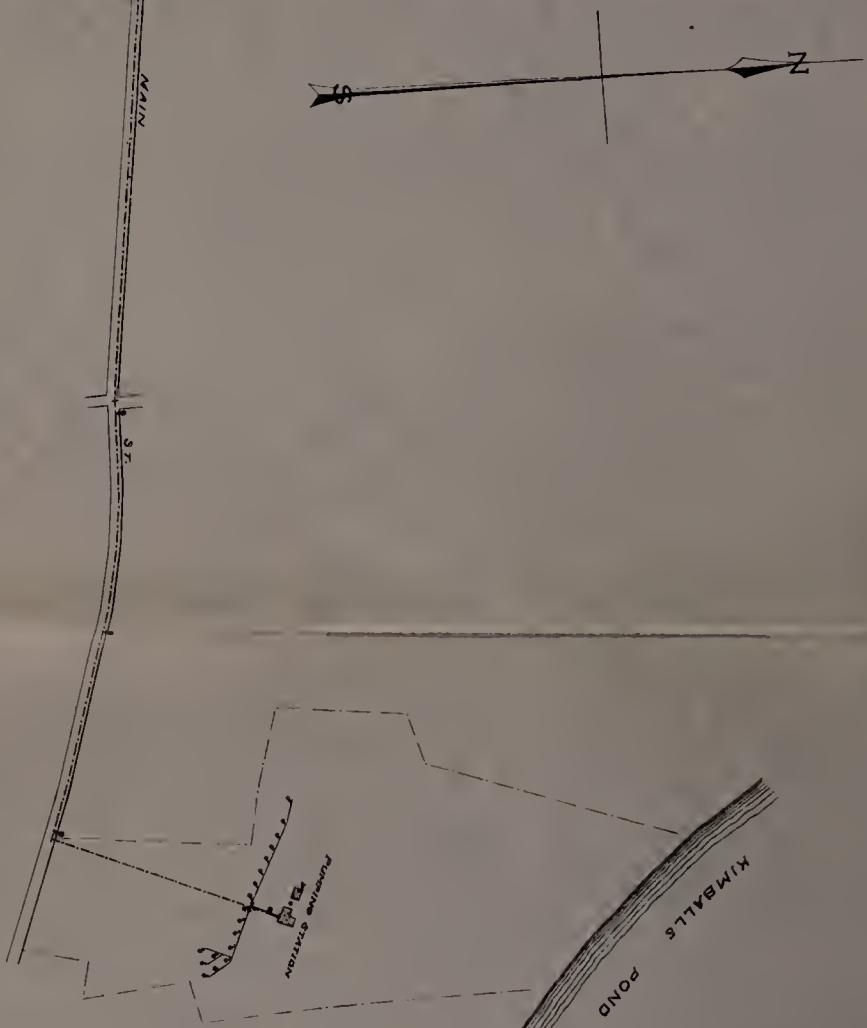
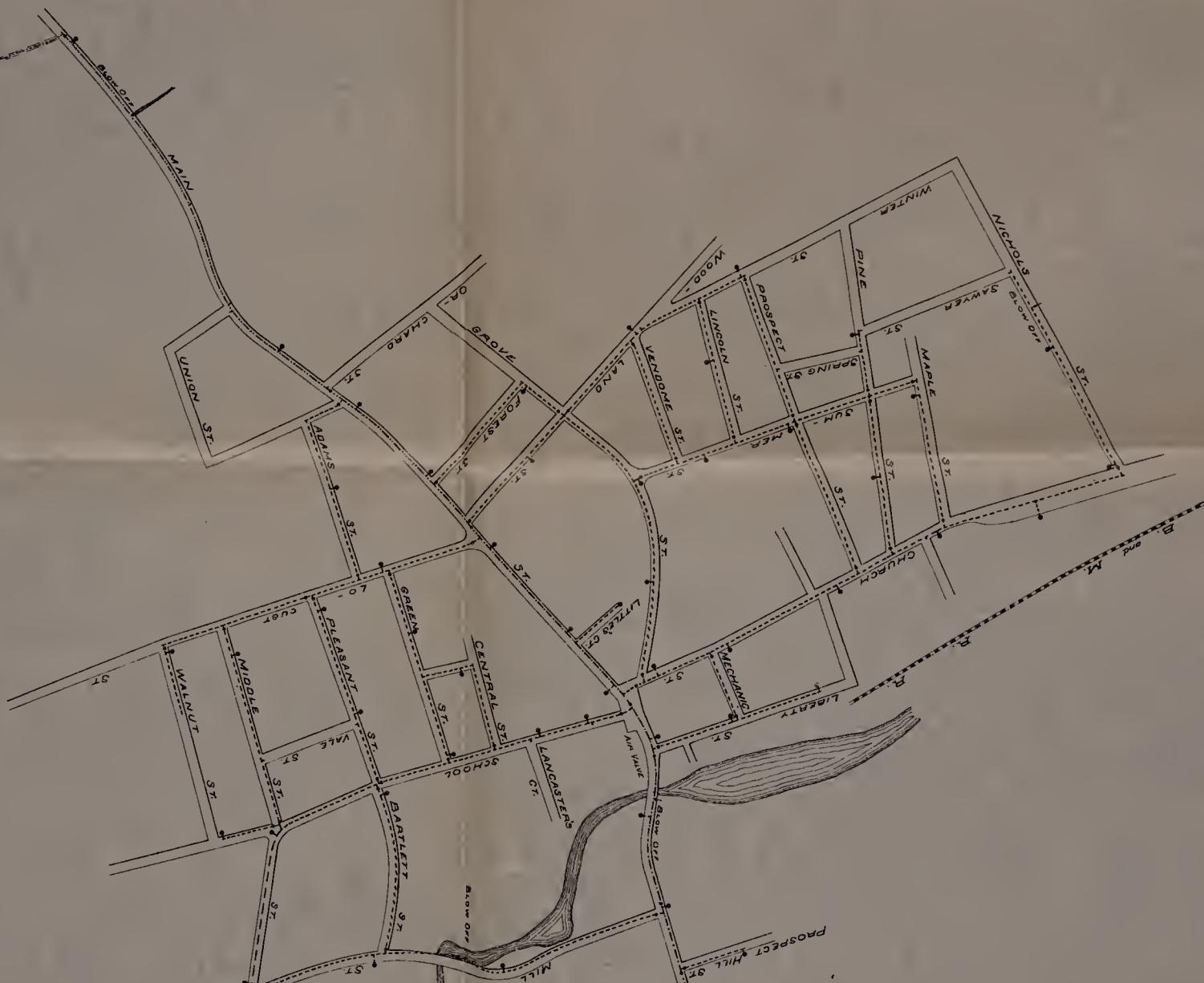
SCALE OF FEET

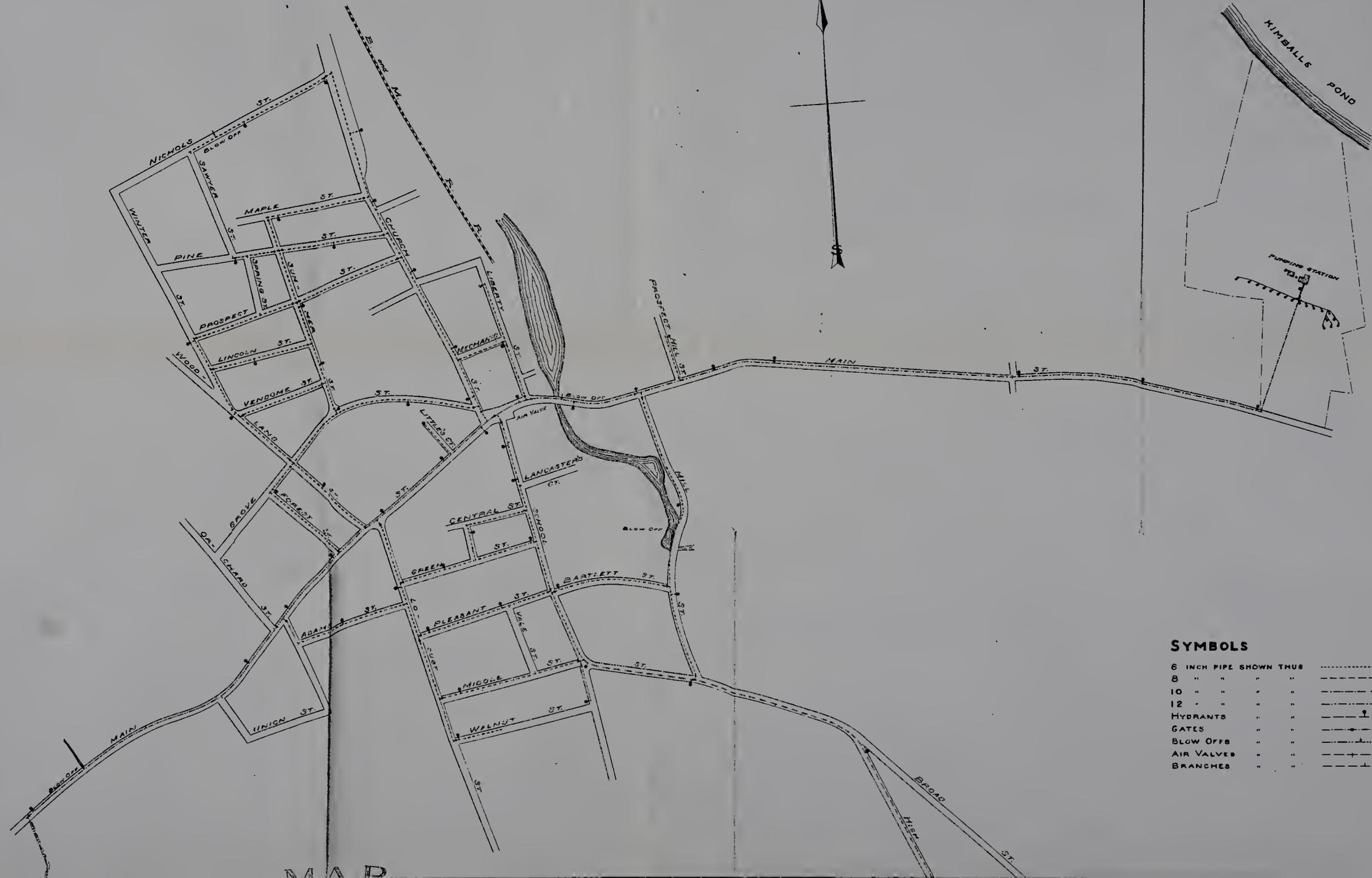
000 400 800 600

FREEMAN C COFFIN
CIVIL & HYDRAULIC ENGINEER
53 STATE ST. BOSTON

STANDPIPE

SYMBOLS	
6 INCH PIPE SHOWN THUS	
8 "	"
10 "	"
12 "	"
HYDRANTS	
GATES	
BLOW OFFS	
AIR VALVES	
BRANCHES	





SYMBOLS

8 INCH PIPE SHOWN THUS	-----
8 "	"
10 "	"
12 "	"
HYDRANTS	"
GATES	"
BLOW OFFS	"
AIR VALVES	"
BRANCHES	"

卷之三

N. H. Goldsmith

Town

MERRIMACK

